23rd Meeting of CCPR, Sep. 22-23, 2016, BIPM, Sevres, France

Report of Working Group on Key-Comparisons

Chair Y. Ohno

WG-KC had its 2016 meeting at BIPM
9:00-18:00 Sep. 21, 2016

Agenda

1. Opening and introductions, appointment of recording secretary
2. Additions to the agenda
3. Documents presented to the meeting
4. Approval of the minutes of 2015 meeting (Beijing), Review of action items
5. Review of Membership of WG-KC and Task Groups
6. Review of Terms of Reference
7. **Reports by pilots of on-going CCPR Key Comparisons**
8. Reports on progress of CCPR supplementary comparisons
9. **Reports from the RMOs on comparison activities**
10. Proposals for new comparisons
11. 2nd-round CCPR KCs
12. **Reports from Task Groups**
13. General issues on RMO and CCPR Comparisons
14. **Guidelines**
15. Other business
16. Next meeting

Working documents for 2016 WG-KC meeting

	File	Title	Author	Latest update	File type/ size
↘	CCPR-WG-KC/16-01	WG-KC 2016 meeting agenda	Y. Ohno	2016/09/09	PDF 20 kbytes
↘	CCPR-WG-KC/16-02	CCPR-WG-KC 2015 minutes draft 2	M. Stock	2016/09/09	PDF 102 kbytes
↘	CCPR-WG-KC/16-03	WG-KC Taks Group list	Y. Ohno	2016/09/09	PDF 171 kbytes
↘	CCPR-WG-KC/16-04	Final reports published since last meeting	Y. Ohno	2016/09/19	PDF 177 kbytes
↘	CCPR-WG-KC/16-05	WG-KC Terms of Reference Sep 2016	Y. Ohno	2016/09/09	PDF 98 kbytes
↘	CCPR-WG-KC/16-06	comparison between CCPR and Euramet guidelines fro RMO comparisons	E. Ikkonen	2016/09/09	PDF 49 kbytes
↘	CCPR-WG-KC/16-07	Guidelines for RMO PR Sup. Comp.	Y. Ohno	2016/09/09	PDF 46 kbytes
↘	CCPR-WG-KC/16-08	Report to the CCPR WG-KC from the ?Comparison Analysis Task Group?	A. Koo	2016/09/14	PDF 622 kbytes
↘	CCPR-WG-KC/16-09	NRC (pilot) report #3 of the CCPR-K3.2014 Luminous Intensity Comparison	A. A. Gaertner	2016/09/19	PDF 25 kbytes
↘	CCPR-WG-KC/16-10	List of planned RMO Comparisons	Y. Ohno	2016/09/20	EXCEL 13 kbytes
↘	CCPR-WG-KC/16-11	CCPR Pilot Comparison for Spectral Regular Transmittance in UV	N. Nel-	2016/09/20	PDF

WG-KC Membership

A new member, NIM (China), was approved in 2015.

Current members of WG-KC:

KRISS (Korea), LNE (France), MIKES (Finland), NIM (China), NIST (USA), NMIA (Australia), NMIJ (Japan), NPL (UK), NRC (Canada), PTB (Germany), VNIIOFI (Russia)

Pilot laboratories of on-going key comparisons – MSL (New Zealand) pilot of CCPR K6.

- We have WG-KC membership criteria, in WG-KC Terms of Reference document (CCPR-WG-KC/16-05)

Task Groups

TG-1 Pilot comparison for spectral regular transmittance in the UV

Chair: Natasha Nel-Sakharova (NMISA) Members: NMISA, MSL, NPL, NRC, PTB

TG-2 RMO Linkage

Chair: Emma Woolliams (NPL) Members: NPL, MIKES, NMIJ, KRISS

TG-3 Comparison analysis

Chair: Emma Woolliams (NPL) Members: NPL, NIST, MSL, PTB, MIKES, NMIA, KRISS, VNIIOFI, NIM, CSIC

Subtask Group: A new appendix for CCPR-G2 providing guidance on the fixed-effects model

Members: MIKES (E. Ikonen), PTB (L. Werner), NPL (E. Woolliams), MSL (A. Koo), NIST (Y. Ohno) and NIM (Y. Lin).

TG-4 Pilot study for the use of alternative standards for photometric comparisons

Chair: MIKES (E. Ikonen)

Members: MIKES, KRISS, LNE, MIKES, MSL, NIST, NMIJ, NRC, PTB

CCPR comparisons completed since 2014

CCPR S3 Bilateral comparison on cryogenic radiometers between NPL and UME

Pilot: NPL

Final report published, August 2016

Pilot comparison on THz spectral responsivity

Pilot PTB

Participants: NIM, NIST, PTB

Report published.

On-going CCPR Key Comparisons

K6-2010 Regular Spectral Transmittance (MSL) Draft B approved

K3 (2nd) Luminous intensity (NRC) Draft A in preparation

K2.b (2nd) Spectral Responsivity 300 – 1000 nm (KRISS)
measurement in progress

K2.a (2nd) Spectral Responsivity 900 – 1600 nm (NPL)

Protocol has just been approved.

K4 (2nd) Luminous flux (NMIJ) Protocol being finalized

- NPL withdrew from participation. EURAMET PR TC is to decide whether they select an NMI to fill this open position and which NMI. NPL offers GEC 200 W flux lamps available for purchase.
- LNE keeps 31 GEC 200 W flux lamps from BIPM, available for loan.

K1.a (2nd) Spectral Irradiance 250 – 2500 nm (VNIIOFI)

Protocol being developed.

Reports from the RMOs on comparison activities

We shared status of on-going Key and Supplementary Comparisons in **APMP, AFRIMETS, COOMET, EURAMET, SIM**

<Discussions>

- WG agreed that "RMOs are encouraged to report the status of consistency check after a comparison is completed, at annual WG-KC meeting.
- We developed **List of Planned RMO PR comparisons**, which is to be posted on public-access area of BIPM website. The list is updated annually.

WG-KC Report 2016

Planned RMO Key Comparisons — status: Sep. 2016

RMO	KC No.	quantity	year of measurement start	pilot	link labs	interested participants	remarks
APMP	K1.a	spectral irradiance 250 nm ~ 2500 nm	2016	KRISS (Korea)	KRISS	NMIT, NPLI, NMISA, NIS(Egypt)	to be decided in 2015 whether linked to first or second round
AFRIMETS							
COOMET	K1.a	spectral irradiance 250 nm to 2500 nm	2017 or 02018	VNIIOFI	VNIIOFI, PTB (?)	NSC "IM" (Ukraine), BelGIM (Belarus), UME	Will be started just after CCPR-K1a measurements
EURAMET	K6.2015	Regular spectral transmittance (380 to 1000nm)	2016	LNE	LNE, PTB	BelGIM, BIM (BG), CMI(CZ), INM-MD(MD), DMDM(RS), GUM(PL), INM(RO), INRIM(IT), IO-CSIC(ES), METAS(CH), NSC "IM"(UA), SP(SE), UME(TR), VSL (NL), VTT(FI)	
EURAMET	K3	Luminous intensity or luminous responsivity		TBD	VSL	UME(TR), SMU(SK), VTT(FI), IPQ(PT), IO-CSIC(ES), GUM(PL), (VSL)[1] , SP(SE),PTB(DE), INM(RO) , BIM-NCM(BG), BEV(AT), DMDM(RS), INRIM(IT), CMI(CZ)	
EURAMET	K4	Luminous flux		TBD		UME(TR), SMU(SK), VTT(FI), IO-CSIC(ES), GUM(PL), MKEH(HU), SP(SE), INM(RO) , METAS(CH), BIM-NCM(BG), BEV(AT), DMDM(RS), NPL(UK), INRIM(IT), CMI(CZ)	
EURAMET	K2.b	Spectral responsivity (300 nm to 1000 nm)		TBD		SMU(SK), VTT(FI), IPQ(PT), IO-CSIC(ES), GUM(PT), MKEH(HU), VSL(NL) , METAS(CH), EIM(GR), SP(SE), INM(RO) , BIM-NCM(BG), DMDM(RS), NPL(UK), INRIM(IT), CMI(CZ), JV(NO), UME(TR)	

Continued

EURAMET	K2.a	Spectral responsivity (900 nm to 1600 nm)		TBD		UME(TR), SMU(SK), VTT(FI), IO-CSIC(ES), GUM(PL), MKEH(HU), METAS(CH), EIM(GR), SP(SE), NPL(UK), INRIM(IT), CMI(CZ), JV(NO)	
EURAMET	K1.a	Spectral irradiance (250 nm to 2500 nm)		TBD		UME(TR), SMU(SK), VTT(FI), IO-CSIC(ES), MKEH(HU), METAS(CH), EIM(GR), SP(SE), INM(RO) , BIM-NCM(BG), DMDM(RS), NPL(UK), CMI(CZ)	
EURAMET	K5	Spectral diffuse reflectance (360 nm to 820 nm)		TBD		UME(TR), VTT(FI), IPQ(PT), GUM(PL), PTB(DE), METAS(CH), EIM(GR), SP(SE), INM(RO) , BIM-NCM(BG), INRIM(IT), CMI(CZ)	
EURAMET	K1.b	Spectral irradiance UV		TBD		UME(TR), MKEH(HU), EIM(GR), DMDM(RS), CMI(CZ)	
EURAMET	K2.c	Spectral responsivity UV (200 nm to 400 nm)		TBD	VSL	UME(TR), SMU(SK), VTT(FI), IO-CSIC(ES), GUM(PL), MKEH(HU), VSL(NL) , EIM(GR), SP(SE), DMDM(RS), CMI(CZ)	
SIM	K3	Luminous Intensity	2017	CENAM	NIST, NRC	INTI, INMETRO	

RMO Supplementary Comparisons in plan **status: Sep. 2016**

RMO	SC No.	quantity	year of measurement start	pilot	interested participants	remarks
APMP	S7	grey scale diffuse reflectance	2016	NIM (China)	NMIT, KRISS, ...	protocol in preparation
AFRIMETS						
COOMET	Sx	Colour, surface	2017 (?)	BelGIM (?)	VNIIOFI, NSC IM (Ukraine), KazInMetr...	Decision on start date will be made in 2017
EURAMET						
SIM						

Time Schedule of 2nd-round CCPR KCs

11.1. Review time schedule of 2nd round KCs

Meas. Start	Id	Quantity	Pilot	Status
2013	K6.2010	Regular spectral transmittance	MSL	Approved by WG-KC.
2014	K3	Luminous intensity	NRC	Pre-Draft A
2016	K4	Luminous flux	NMIJ	Protocol being developed
2016	K2.b	Spectral responsivity 300 nm to 1000 nm	KRISS	Meas to start
2016	K2.a	Spectral responsivity 900 nm to 1600 nm	NPL	Meas to start
2017	K1.a	Spectral irradiance 250 nm to 2500 nm	VNIIOFI	Protocol July 2016
2017	K5	Diffuse spectral reflectance	MIKES	
2018	K1.b	Spectral irradiance 200 nm to 350 nm	NIST	
2019	K2.c	Spectral responsivity 200 nm to 400 nm	PTB	
2019	K2.d	Spectral responsivity 10 nm to 200 nm	PTB	

Reports from Task Groups

TG1 Task Group on pilot comparison for spectral regular transmittance in UV

Chair: Natasha Nel-Sakharova (NMISA)

- Protocol being developed.
- 200 – 400 nm
- 3 sets of metallic neutral density filters
- 7 levels of optical densities
- Panned participants: NMISA, NPL, NRC, PTB
- Measurements to start in spring 2017.

TG2 Task Group on RMO Linkage

Chair: Emma Woolliams (NPL)

- Most of the work was complete (Appendices in Guidelines G5 and G6)
- Prepare additional guidance for special cases (addressed in COOMET.PR-K1.b.1) to be added in Appendices in G5 and G6.

TG3 Task Group on Comparison Analysis

Chair: Annette Koo (MSL)

(changed from Emma Woolliams (NPL) in 2015)

TG held "**Workshop on Comparison Analysis**", Oct. 2015, Beijing, chaired by E. Woolliams

<Focused topics>

- Politics and purposes of comparisons (support CMCs)
- models and solutions (fixed-effects model, etc.)
- Inconsistency in comparison results (e.g., outliers)
- Linking regional comparisons
- Checking consistency between CMCs and KC results

Conclusion of the Workshop

Create a Task Group to develop a new appendix for G2 providing guidance on the fixed-effects model and on least-squares techniques to be possibly used in CCPR comparison analyses.

This Task Group was established at WG-KC meeting in 2015.

Members: MIKES (E. Ikonen), PTB (L. Werner), NPL (E. Woolliams), MSL (A. Koo), NIST (Y. Ohno) and NIM (Y. Lin).

Discussion of TG3 in 2016

- A draft of Appendix for G2 on the GLS models was developed by A. Koo. This will be further reviewed and to be published as a revision of Guidelines G2.

- TG will develop a proposal for revising G2 and Appendix to explicitly refer to fixed effects model by the end of 2016.

- Need for further research on this topic was emphasized.

- WG-KC agreed to organize a **Workshop on Models for Comparison Analysis** at an appropriate opportunity in 2017 (preferably at the time of NEWRAD 2017).

TG-4 Pilot study for the use of alternative standards for photometric comparisons

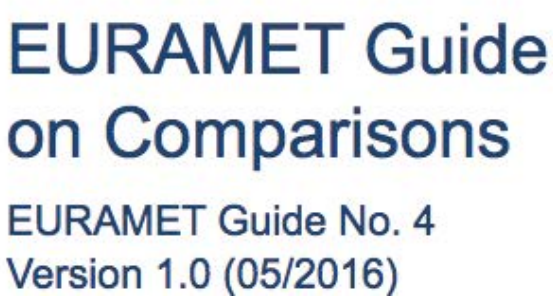
Chair: MIKES (E. Ikonen)

Members: MIKES, KRISS, LNE, MIKES, MSL, NIST, NMIJ, NRC, PTB

Investigate alternative transfer standard artifacts (white LED sources, LED lamps) for use in the future CCPR and RMO photometric comparisons (K3, K4).

TG started collecting information of recent research by member NMIs.

New EURAMET Guidelines on Comparisons conflicting CCPR Guidelines



There are critical differences in procedures between this new EURMET Guide and CCPR Guidelines on Comparisons. e.g.

- Participants need to sign a commitment form.
- Time (2 months) from completion of measurement to Draft A distribution. EURAMET guide does not allow Pre-Draft A process – a very important process agreed in CCPR.

WG-KC proposes that CCPR starts official communication to EURAMET to resolve this conflict. → **Decision by CCPR requested.**

CCPR Guidelines for Comparisons

CCPR publications and bibliography

Meeting reports | Strategy document | Guidance documents | Other publications | Member bibliographies | CCPR

CCPR-G2: Guidelines for CCPR key comparison report preparation, CCPR-G2 (rev.3), 2013, 14 p

CCPR-G4: Guidelines for preparing CCPR key comparisons, CCPR-G4, 2013, 7 pp.

CCPR-G5: Guidelines for CCPR and RMO bilateral key comparisons, CCPR-G5, 2014, 8 pp.

CCPR-G6: Guidelines for RMO key comparisons in PR, CCPR-G6, 2014, 14 pp.

WG-KC has near-final draft of:

CCPR-G7 Draft Guidelines for RMO PR Supplementary Comparisons

The draft will be circulated to WG-KC members for final check, and to be submitted for CCPR approval by end of 2016.

Next meeting of WG-KC

We propose two and half days for WG meetings right before NEWRAD 2017 in Tokyo, including a full-day WG-KC meeting and a half-day Workshop on Models for Comparison Analysis.